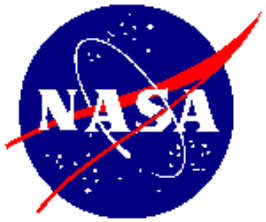


Safety….The NASA Family….Excellence….Integrity

Institutional/Facility/Operational (IFO) Safety Audits

Compliance Verification Workshop

September 14, 2004

Presented by: Arthur R. Lee, P.E.

Office of Safety and Mission Assurance
Review and Assessment Division

Transformation: Implementation of the Review and Assessment Division

- **Five Elements**
  - **Institutional/Facility/Operational (IFO) Safety Review and Assessment**
  - **Programmatic Audit and Review**
  - **Operational Readiness Review**
  - **Special Projects and Benchmarking**
  - **Process Based Mission Assurance – Knowledge Management System (PBMA – KMS)**

Review & Assessment Division Audit Process Development

- **Programmatic Audit and Review Process**
  - Lead: Mr. Stephen Wander
  - Requirement Document Groups I, III, and IV

  Group I – Over-arching SMA Philosophy and Policies
  Group III – Program Implementation
  Group IV – Program Class

- **Institutional/Facility/ Operational Safety Audit Process**
  - Lead: Mr. Art Lee
  - Requirement Document Groups I, II, III and V

  Group I – Over-arching SMA Philosophy and Policies
  Group II – Institutional/Operational Safety
  Group III – Program Implementation
  Group V – Contingency/Recovery/Investigation

IFO Safety Audit Responsibility

- **Section 4.6 of NPR 1000.3A, *The NASA Organization:***
  - **The Office of Safety and Mission Assurance provides Leadership, Policy Direction, Functional Oversight, Assessment, and Coordination … for the Verification of the Effectiveness of SMA Programs and Processes.**

30 IFO Safety Requirement Documents Identified

Group I: OVERARCHING SMA PHILOSOPHY & POLICY (3)
Foundation Documents P / I

Top SMA Doc, NPD 8700.1B
Risk Management, NPR 8000.4
Safety Manual NPR 8715.3
Annual Operating Agreements - Center specific SMA "management contracts" *(Not included in the total of 51 auditable SMA Req'mts)*

Group II: INSTITUTIONAL/OPERATIONAL SAFETY (IOS) GROUP (10)
Safety Implementation I

OSHA HB, NPR 8715.1
Safety, NPD 8710.2D
Facility Safety, NASA-STD-8719.7
Pressure Vessels, NPD 8710.5B
Pressure Vessels, NPR 8715.4
Underwater Facility Safety, NASA-STD-1740.10
Lifting Devices, NASA-STD-8719.9
Fire Protection, NASA-STD-8719.11
Facility Operations Readiness Review, NASA-STD-8719.1
Aviation Safety, NPR 7900.3A *(Code O=OPR)*

Group III (A): PROGRAM IMPLEMENTATION (22) P / I
Designing / Building / Testing / Operating / Retiring

Reliability, NPD 8720.1B
New PRA Doc, NPR 8705.5
Rel. Plng for Pgms, NASA-STD-8729.1

Orbital Debris, NPD 8710.3B
Range Safety, NPR 8715..X

S/W IV&V Directive NPD 8730.4A
S/W Assurance Standard, NASA-STD-8739.8
S/W Formal Insp.Std, NASA-STD-2202-93
S/W Safety Std, NASA-STD- 8719.13B
S/W Dev Req, NASA-STD- 2100-91
S/W Eng Requirements, NPR 7150

QA Placeholder Doc
Parts, NPD 8730.2B
Parts/GIDEP, NPR 8735.1A
Calibration, NPD 8730.1B
Supl. Audit/Surv, NPR 8735.2
NASA-STD-8739.4 Wire Crimp & Cable
NASA-STD-8739.5 Fiber Optics
NASA-STD-8739.3 Soldering
NASA-STD-8739.2 Surface Mont
NASA-STD-8739.1 Conformal Coating
Hydrogen, NASA-STD-1740.16
Explosive, NASA-STD-1740.12

Group III (B): Program Specific Implementation of SMA Requirements
Critical to Flow-down of SMA Baseline Req'mts (Not included in the total of 51 auditable SMA Req'mts)

Pgm & Prj Mgmt, NPD 7120.4 and NPR 7120.5C
- PCA
- Program Plan
- Project Plan
- Project SMA Plan
- Level 0/1 Requirements

Chief Engineer = OPR

SMA Implementation within Contract / MOUs / Grants (e.g. Systems Effectiveness Plan or equivalent)
{NASA FAR Supplement Requirements and Risk Based Acquisition Mgmt (RBAM) Implementation}

Group IV: PROGRAM CLASS - REQUIREMENTS DOCUMENTS (10)
Unique To Specific Programs P

Inst / Launch Serv, NPD 8700.3A
Payload Class, NPR 8705.4

Human Rating, NPR 8705.2

Experimental Aerospace Vehicles SMA Policy NPD 8700.2A
Experimental Aerospace Vehicles SMA Requirements NPR 8705.3

ELV SMA R&R, NASA-STD-8709.2
ELV/Payload Safety Review, NASA-STD-8719.8
ELV Oversight, NPD 8610.23A *(Code M=OPR)*
ELV Review, NPD 8610.24A*(Code M=OPR)*
ELV Risk Mitigation, NPD 8610.7A *(Code M=OPR)*

Group V: CONTINGENCY / RECOVERY / INVESTIGATION (5) I
Preparing For & Responding To Incidents

Continuity of Operations, NPD 1040.4A
Continuity of Operations, NPR 1040.1
Emergency Preparedness, NPD 8710.1B
Emergency Preparedness, NPR 8715.2
Mishap Investigation, NPR 8621.1A

18 IFO Safety Audit Process Areas

- Safety and Mission Assurance
- Safety Manual
- Safety and Health
- Facility Safety
- Fire Protection
- Underwater Facility Safety
- Mishap Investigations
- Emergency Preparedness
- Continuity of Operations
- Metrology and Calibration
- Lifting Devices & Equipment
- Pressure Vessels & System
- EEE Parts
- GIDEP Alerts
- Explosives Safety
- Hydrogen Safety
- Oxygen Safety
- Aviation Safety

If you can't describe what you are doing as a process, you don't know what you're doing.

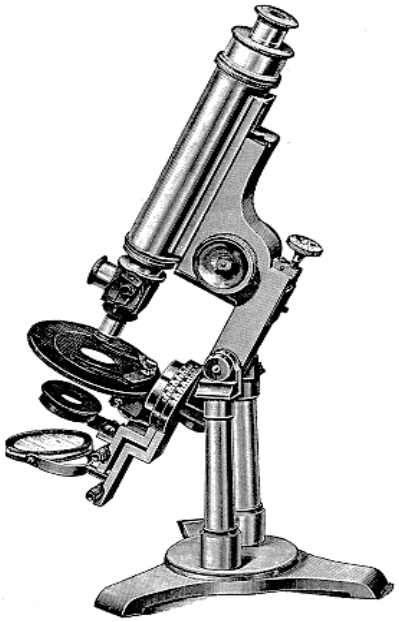
W. Edwards Deming

Purpose of IFO Safety Audits

- Verify Compliance with SMA Requirements
  - Verify Flow-down of Agency-wide SMA Policies & Requirements from NASA Headquarters
  - Verify NASA Centers' Processes are in-place to Implement the SMA Requirements
  - Verify the Process is Stable, Capable, and Controlled
  - Verify Practice by NASA Centers corresponds with Procedures
  - Assess the NASA Centers' Processes, Procedures, and Practices being exercised to Implement the SMA Requirements
- Provide all levels of the NASA Center's Management and Organizations with an Independent, Objective, and Constructive Evaluation of the Effectiveness and Efficiency with which SMA Responsibilities and Requirements are being implemented

IFO Safety Audit Philosophy

- Focus on a few processes during a Single Audit
- Not a Top-Level or Cursory look at the Requirements
- An intense, focused look to verify:
  - Compliance to the Requirements
  - Good Health of the Whole Process
- Group Audits by Focus Area to quickly:
  - Determine Best Practices within the Agency
  - Identify Areas for Agency-wide Improvements



The devil is in the details, and everything we do in the military is a detail.

George Hyman Rickover

U.S. Naval Officer who developed nuclear-powered submarines 1900-1986

Leverage Off Other Audits, Reviews, and Assessments

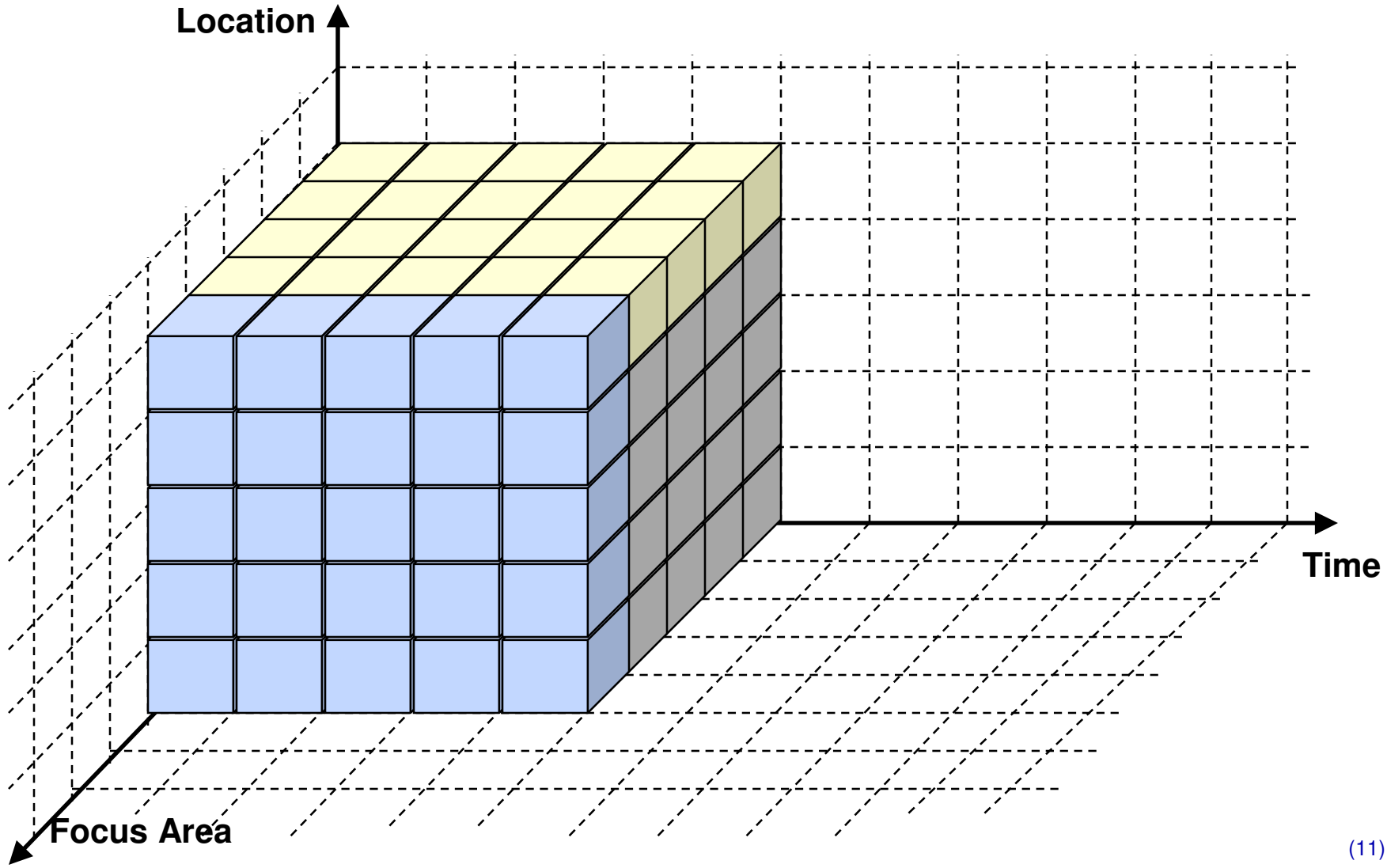
Audits, reviews, and assessments conducted by other organizations (or parts of other audits, reviews, and assessments) may be used to demonstrate verification of compliance with some requirements.

- Mishap/Close-Call Investigations
- Operational Readiness Inspections (ORIs)
- OSHA
  - Periodic Inspections
  - Complaint/Facility Inspection
  - Voluntary Protection Program (VPP) Evaluation
- Operations & Engineering Panel (OEP) Reviews
- Quality Inspection (Compliance Verification)
- Federal Aviation Administration (FAA) Inspections
- Department of Energy (DOE) Audits
- Interagency Nuclear Safety Review Panel (INSRP)
- Inter-Center Aircraft Operations Panel (IAOP) Reviews
- Nuclear Regulatory Commission (NRC)
- NASA Headquarters' Environmental Audits
- NASA Headquarters' Medical/Health Audits
- Aerospace Safety Advisory Panel (ASAP) Reviews

7 IFO Safety Audit Focus Areas

- Personnel Safety
- Facility Safety
- Contingency/Recovery/ Investigation
- Equipment Safety
- Hardware Safety
- Explosives Safety
- Aviation Safety

IFO Safety Audit Approach

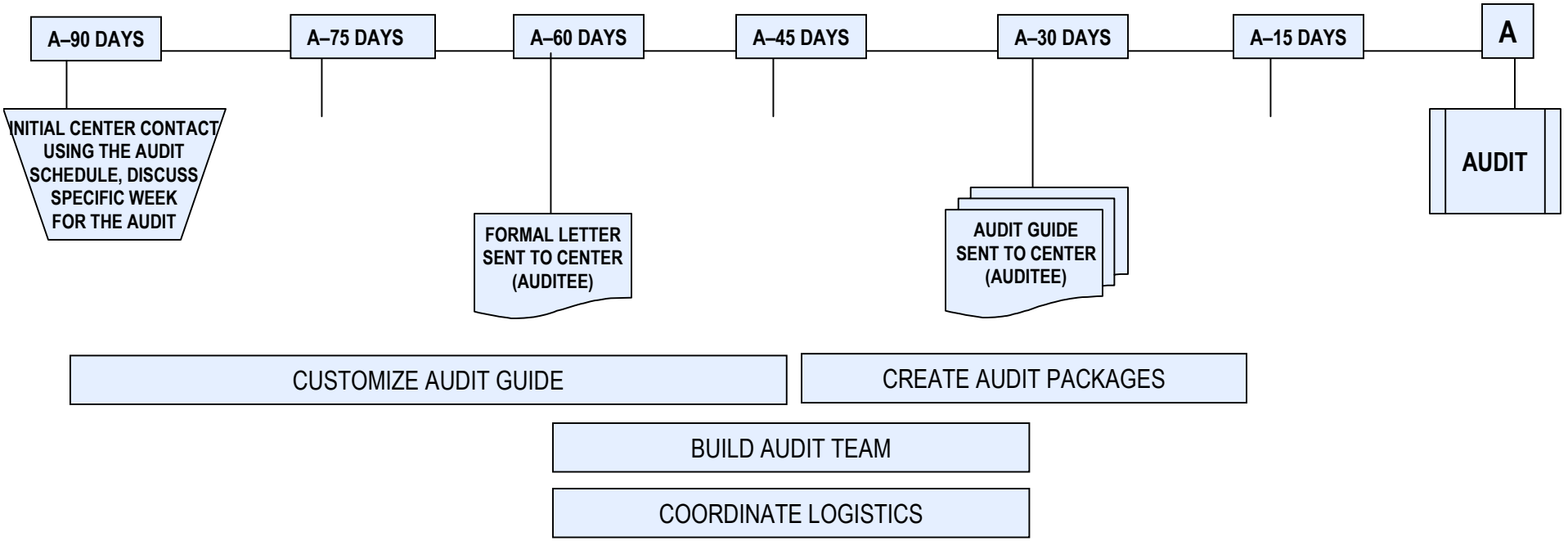


IFO Safety Audit (Built on Best Practices)

- Builds on previous NASA Audit Experience
- Builds on NASA/Navy Benchmarking Exchange (NNBE) Experience (2002 - present)
  - NNBE Participation in Functional Audit of Supervisor of Shipbuilding & Electric Boat Corporation, Groton, Ct.
  - NNBE Participation in Functional Audit of Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility, Hawaii
- Considers CAIB Report
- Adaptation of Successful NASA & Navy Practices

NASA
Institutional/Facility/Operational (IFO)
Safety Audit Process

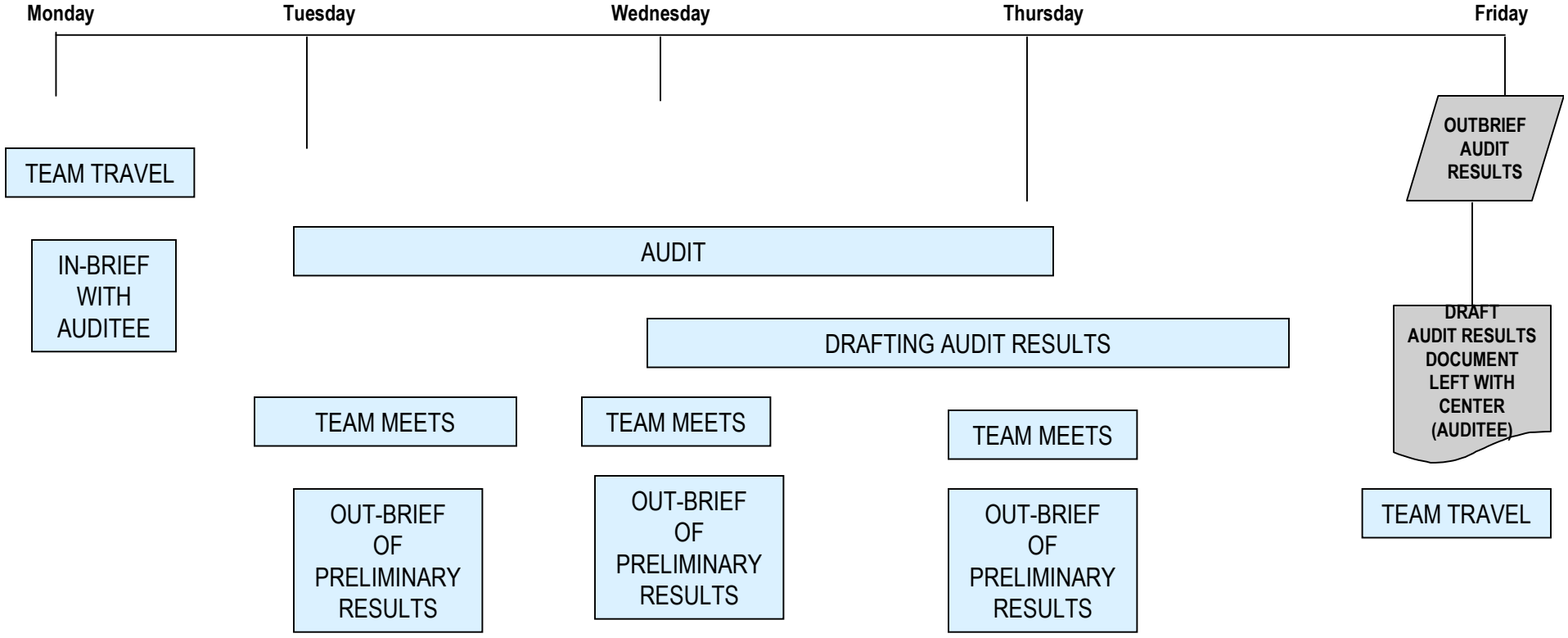
IFO Safety Pre-Audit Timeline



Audit Guide = f {Audit Requirements +Current Events And Initiatives + Annual Operating Agreements + Prior HQ SMA Audit Findings + Other Audit Findings + One NASA Community Best Practices + External Best Practices}

IFO Safety Audit Timeline

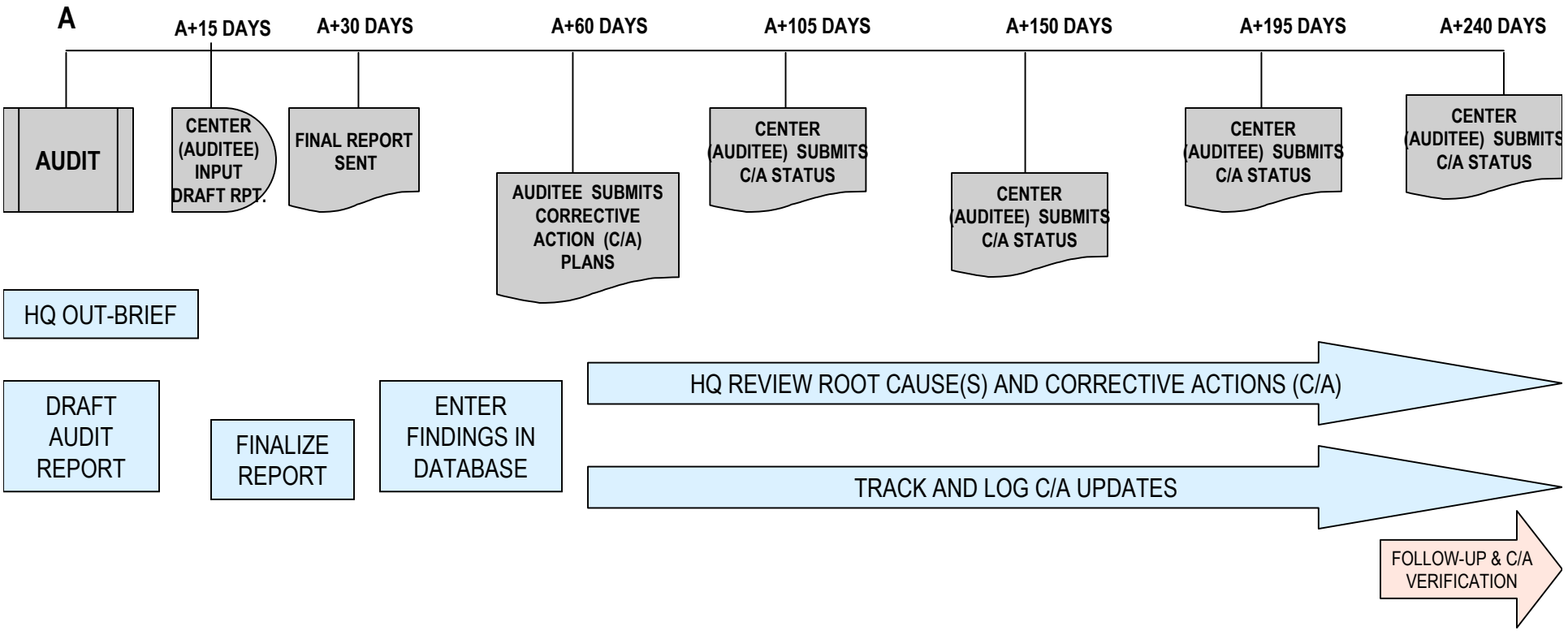
- Verify flow-down of NASA SMA policies (requirements) from HQ to Center or Program procedures
- Verify processes are in place to implement the procedures
  - Verify process is stable, capable, and controlled
- Verify practice corresponds with procedures
  - Observe practices and verify compliance



IFO Safety Audit Timeline

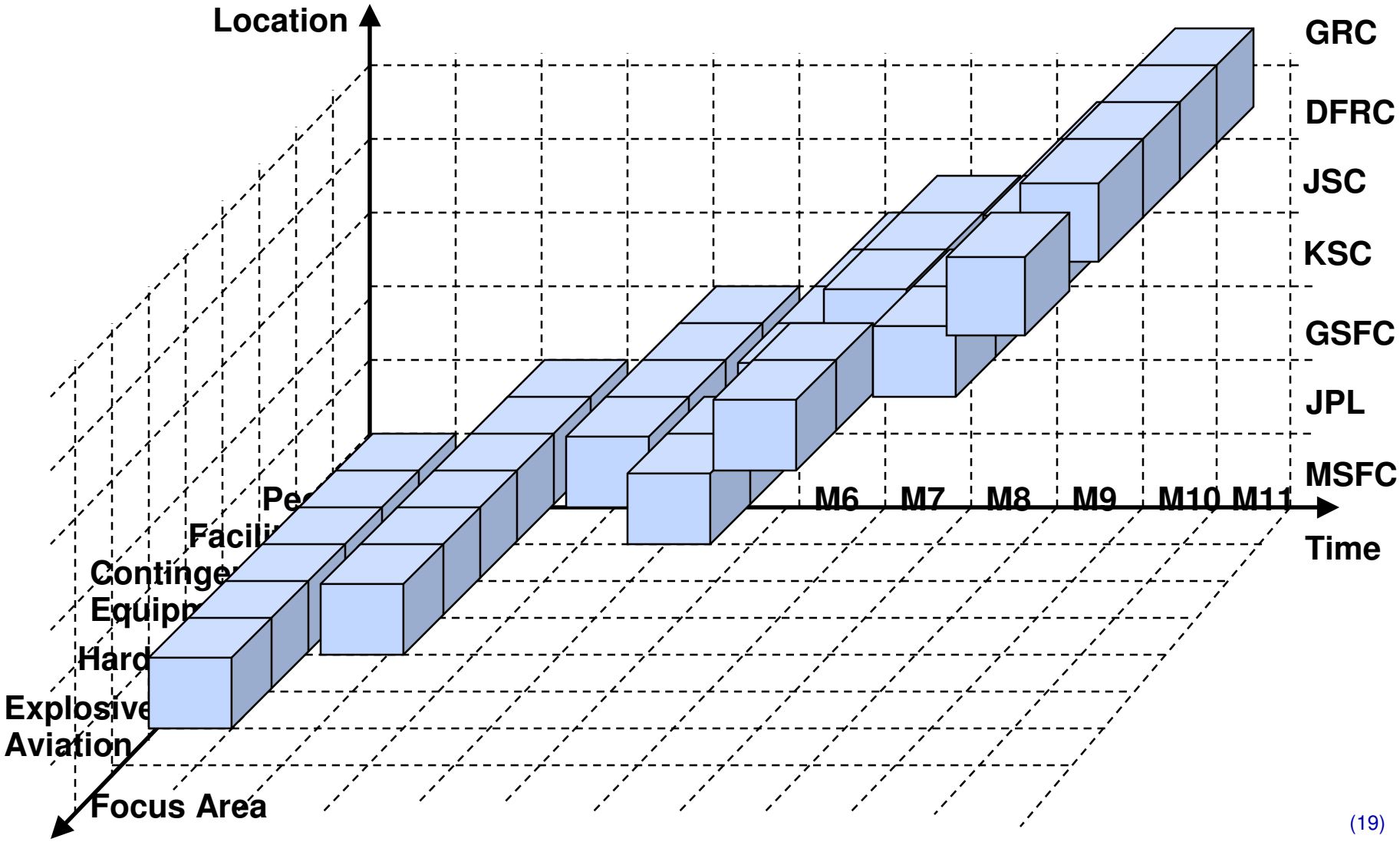
- One Week Audit
- Audit Team
  - OSMA Division Director (Team Lead)
  - 5-7 Team Members (Dependent Upon Review Areas)
  - 2-4 OSMA Contractor Support by Perot Systems Government Services & ARES
- Audit Schedule:
  - Mon. Afternoon: Audit Team In-Briefing to Center Senior Mgmt.
  - Tues. - Thurs.: Conduct Audit Reviews
  - Tues. - Thurs. (COB): Daily Briefing by Audit Team of Preliminary Audit Results to Center Senior Mgmt.
  - Fri. Morning: Audit Team Out-Briefing to Center Director, Center Senior Mgmt., and respective Headquarters' Center Executive (HCE) accompanied by Draft Document of Audit Results

IFO Safety Post-Audit Timeline



NASA
Institutional/Facility/Operational (IFO)
Safety Audit Schedule

IFO Safety Audit Approach



IFO Safety Audit Schedule

Month	Processes/Topics	Locations
Jan ’05	Personnel Safety, Facility Safety, Explosive Safety, Hardware Safety, Equipment Safety, Contingency / Recovery / Investigation	MSFC
Feb ‘05		
March ‘05	Personnel Safety, Facility Safety, Explosive Safety, Hardware Safety, Equipment Safety, Contingency / Recovery / Investigation	JPL
April ’05		
May ‘05	Personnel Safety, Equipment Safety, Facility Safety, Contingency / Recovery / Investigation	GSFC
June ’05		
July ’05	Personnel Safety, Facility Safety, Explosive Safety, Equipment Safety, Contingency / Recovery / Investigation, Aviation Safety	KSC
Aug ’05	Facility Safety, Explosive Safety, Equipment Safety, Contingency / Recovery / Investigation, Aviation Safety	JSC

IFO Safety Audit Schedule

Month	Processes/Topics	Locations
Sept ’05		
Oct ’05	Facility Safety, Explosive Safety, Equipment Safety, Contingency / Recovery / Investigation, Aviation Safety	DFRC
Nov ’05	Hardware Safety, Equipment Safety, Facility Safety, Contingency / Recovery / Investigation, Aviation Safety	GRC
Dec ’05		
Jan ’06	Personnel Safety, Facility Safety, Explosive Safety, Hardware Safety, Equipment Safety, Contingency / Recovery / Investigation	SSC
Feb ’06		
Mar ‘06	Personnel Safety, Hardware Safety, Equipment Safety, Facility Safety	ARC
April ‘06	Facility Safety ,Explosive Safety, Hardware Safety, Equipment Safety, Contingency / Recovery / Investigation, Aviation Safety	LaRC

Fiscal Year 2005 - 2006

Topic	MSFC	JPL	GSFC	KSC	JSC	DFRC	GRC	SSC	ARC	LaRC
Safety and Health	Jan-05	Mar-05	May-05	Jul-05				Jan-06	Mar-06	
Safety Manual	Jan-05	Mar-05	May-05	Jul-05				Jan-06	Mar-06	
Safety and Mission Assurance	Jan-05	Mar-05	May-05	Jul-05				Jan-06	Mar-06	
Underwater Facility Safety	Jan-05				Aug-05					
Facility Safety		Mar-05	May-05	Jul-05	Aug-05	Oct-05	Nov-05		Mar-06	Apr-06
Fire Protection	Jan-05	Mar-05		Jul-05	Aug-05	Oct-05		Jan-06		Apr-06
Lifting Devices	Jan-05	Mar-05			Aug-05	Oct-05	Nov-05	Jan-06	Mar-06	Apr-06
Pressure Vessels		Mar-05	May-05	Jul-05		Oct-05	Nov-05	Jan-06	Mar-06	
Metrology and Calibration	Jan-05	Mar-05						Jan-06	Mar-06	Apr-06
GIDEP	Jan-05	Mar-05					Nov-05	Jan-06	Mar-06	Apr-06
Parts Policy	Jan-05	Mar-05					Nov-05	Jan-06	Mar-06	Apr-06
Explosives Safety	Jan-05	Mar-05		Jul-05	Aug-05	Oct-05		Jan-06		Apr-06
Hydrogen				Jul-05	Aug-05	Oct-05		Jan-06		Apr-06
Oxygen				Jul-05	Aug-05	Oct-05		Jan-06		Apr-06
Aviation Safety				Jul-05	Aug-05	Oct-05	Nov-05			Apr-06
Mishap Investigations	Jan-05	Mar-05	May-05			Oct-05	Nov-05	Jan-06		
Emergency Preparedness	Jan-05	Mar-05	May-05		Aug-05	Oct-05	Nov-05	Jan-06		
Continuity of Operations		Mar-05	May-05	Jul-05	Aug-05	Oct-05				Apr-06